Groundwater Management Issues in Southeast Wyoming

Association of Western State Engineers
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Wyoming State Engineer

Significant Groundwater Management Activities in SE WY since 2011

Laramie County Control Area (LCCA)

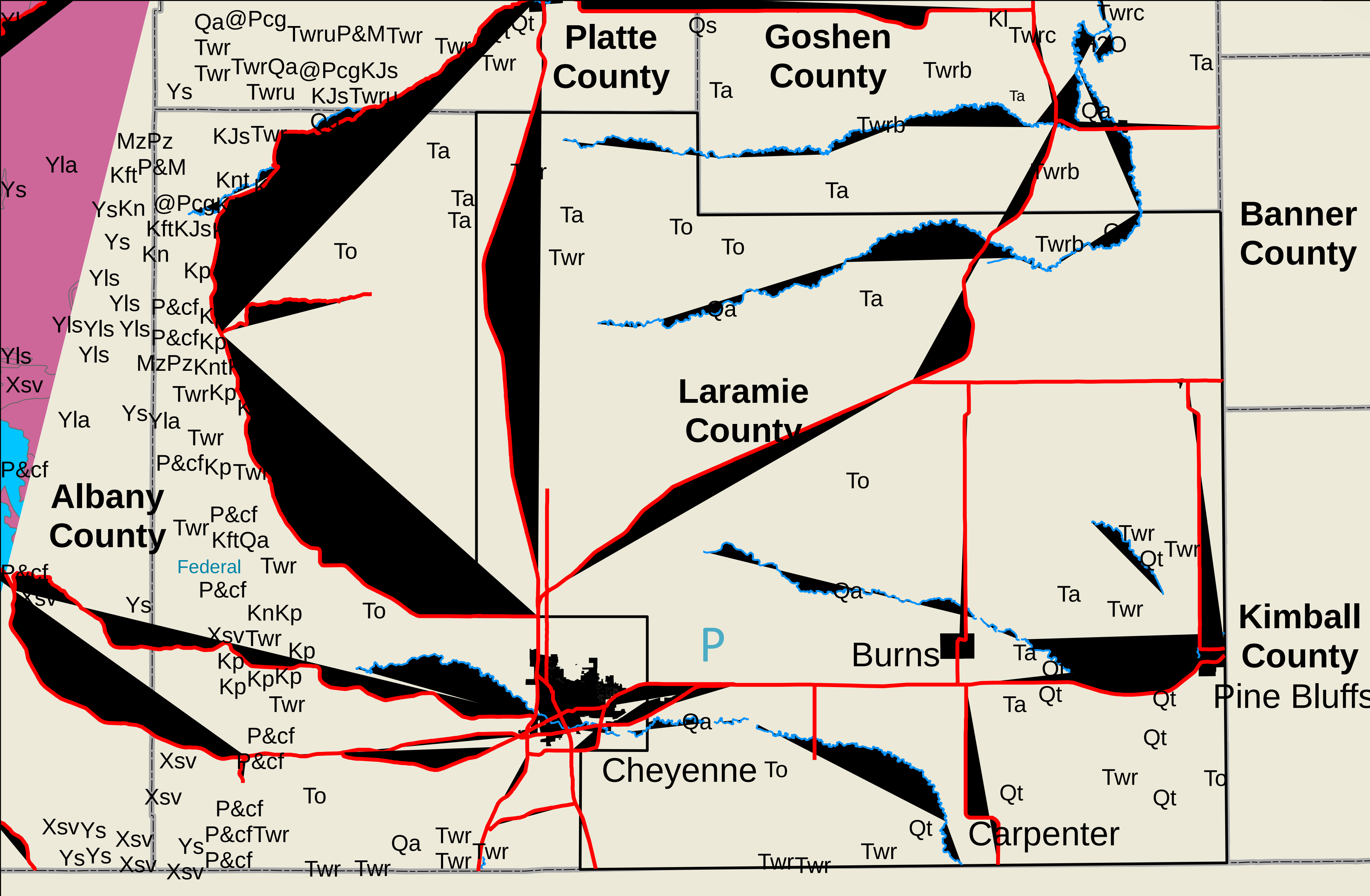
- In April 2012, an Order was issued on a permit application that required a public interest determination. This is known as the "4 Quarters" Order.
- After the 4 Quarters decision, a Temporary Order was entered one day later to stave off any potential "land rush" within the Laramie County Control Area (LCCA) until further management actions could be instituted. This Order, effectively a moratorium, was in place from April 2012 until April 2015.
- On April 1, 2015, an Order was issued for the LCCA, replacing the Temporary Order issued in 2012.

Horse Creek/LaGrange Aquifer

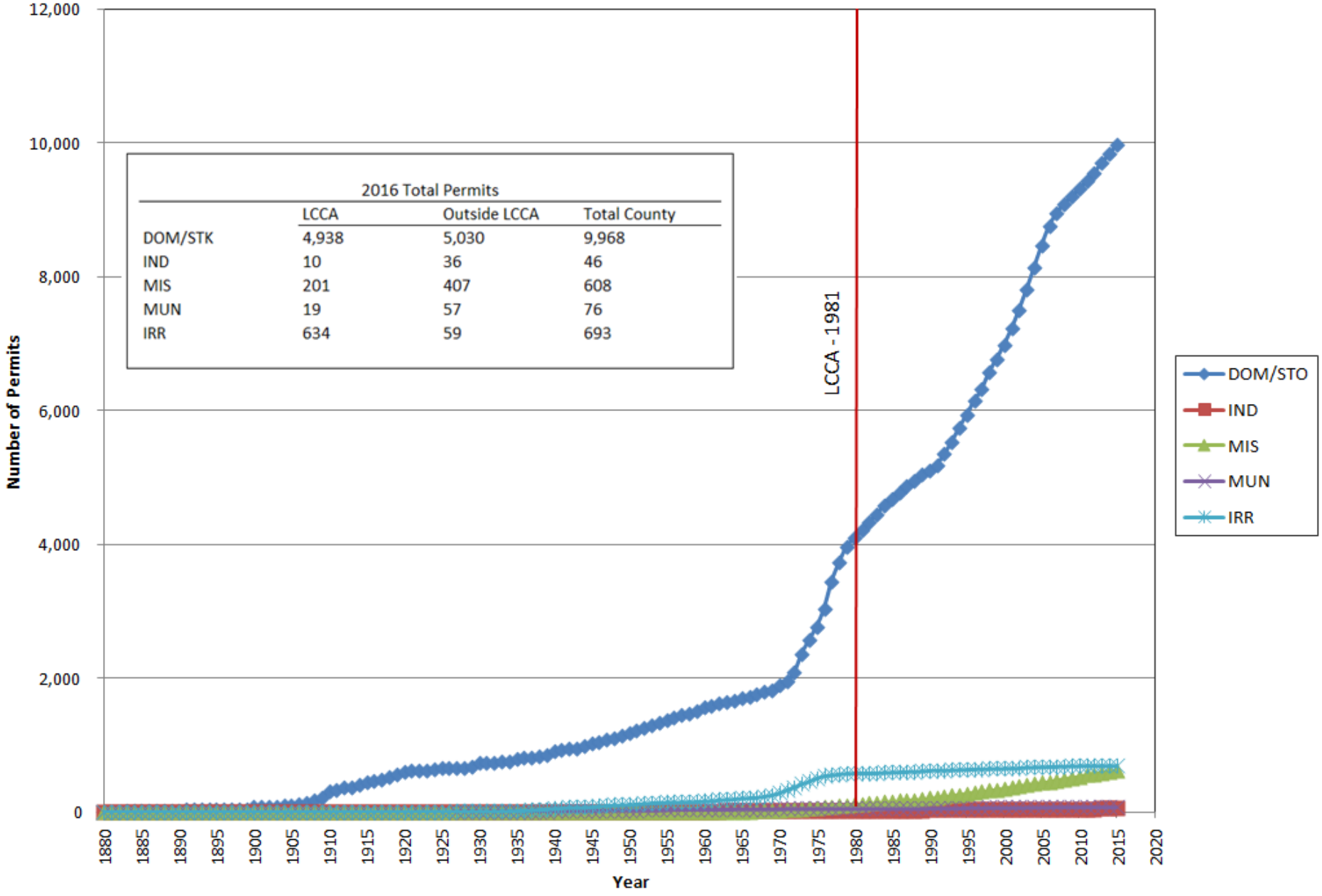
- Long running conflicts between surface and groundwater users in the Horse Creek/Lagrange Aquifer areas resulted in a groundwater model being built that confirmed Horse Creek and the LaGrange Aquifer were interconnected and a single source of supply. A conjunctive use Order was entered in July, 2013.

Laramie County Control Area

- Localized groundwater-level declines and interference between high capacity (predominantly irrigation) wells in the Pine Bluffs lowland has been occurring as far back as the 1940s (Lowry and Crist, 1967).
- Between 1970 and 1973, concerns regarding declining groundwater levels lead to creation of two “Control Areas” (then called Critical Areas) around Pine Bluffs and Carpenter.
- The Laramie County Control Area (LCCA) was established by the Wyoming Board of Control on September 2, 1981.


Platte County
Goshen County
Banner County
Laramie County
Albany County
Kimball County
Pine Bluffs
Federal
P
Burns
Cheyenne
Carpenter

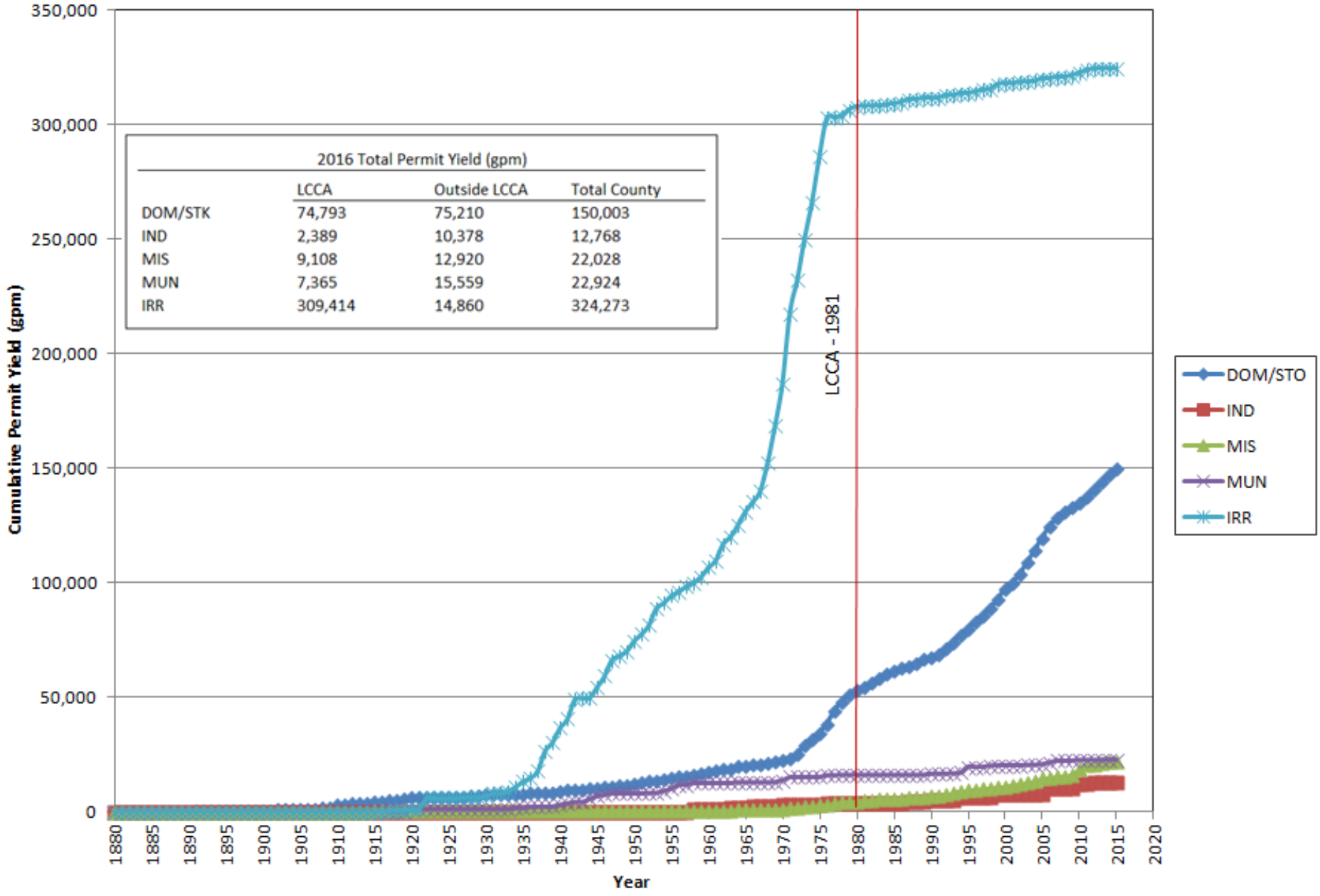
Laramie County Groundwater Permit Cumulative Count by Use



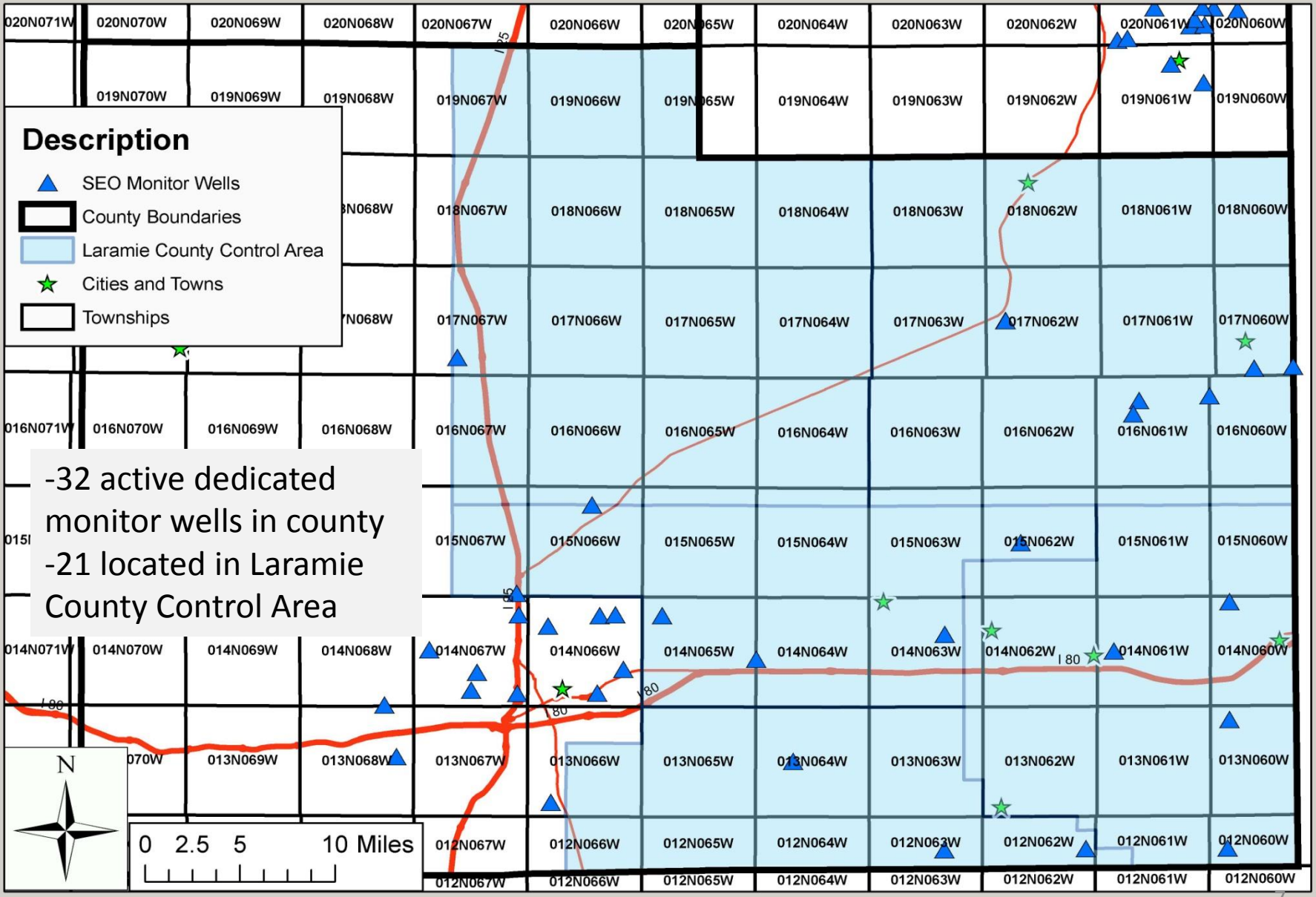
2016 Total Permits

	LCCA	Outside LCCA	Total County
DOM/STK	4,938	5,030	9,968
IND	10	36	46
MIS	201	407	608
MUN	19	57	76
IRR	634	59	693

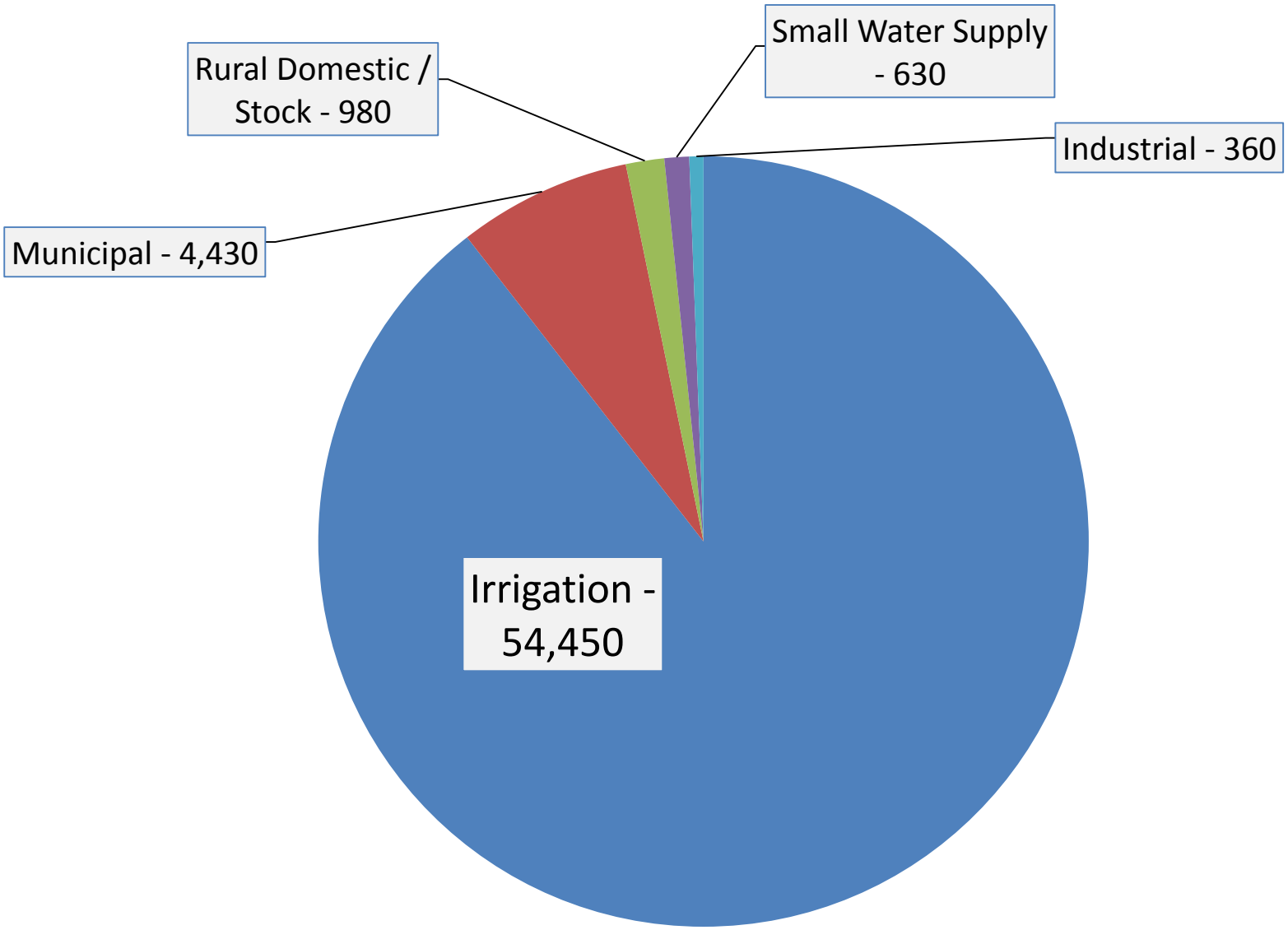
Laramie County Groundwater Permit Cumulative Yield by Use

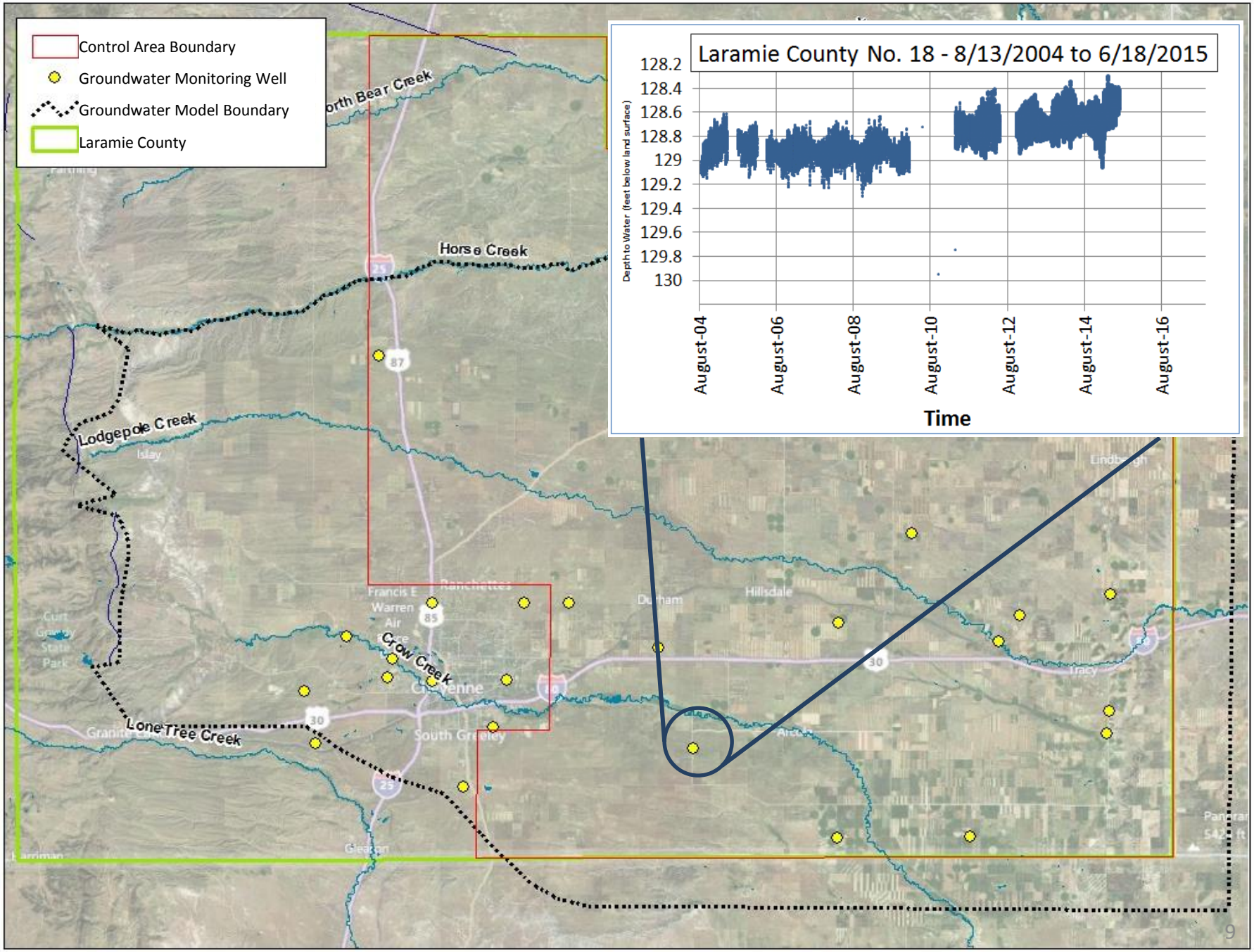


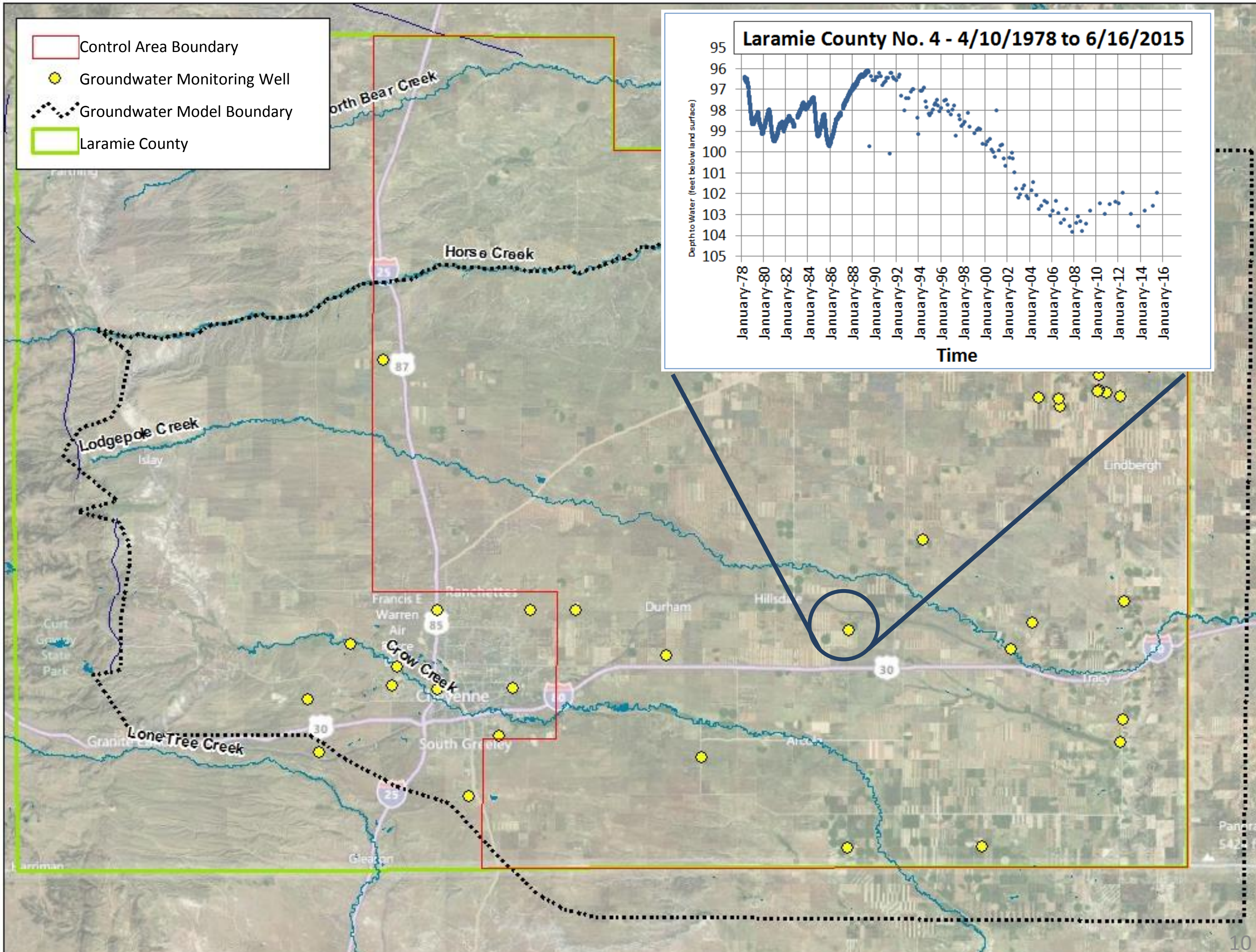
SEO Groundwater Monitor Well Locations



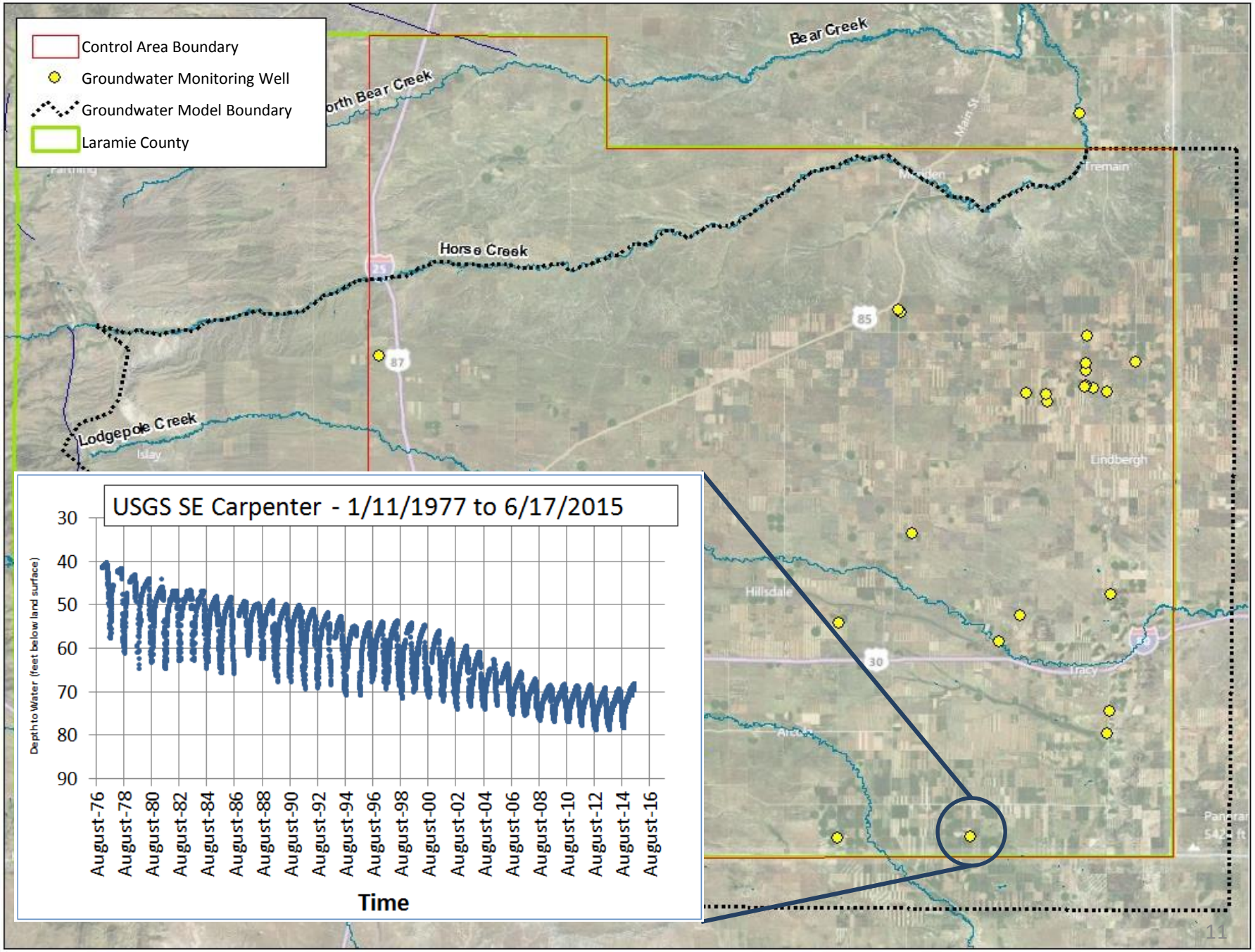
Annual Consumptive Use (Acre-Feet) in Model Area 1993-2010

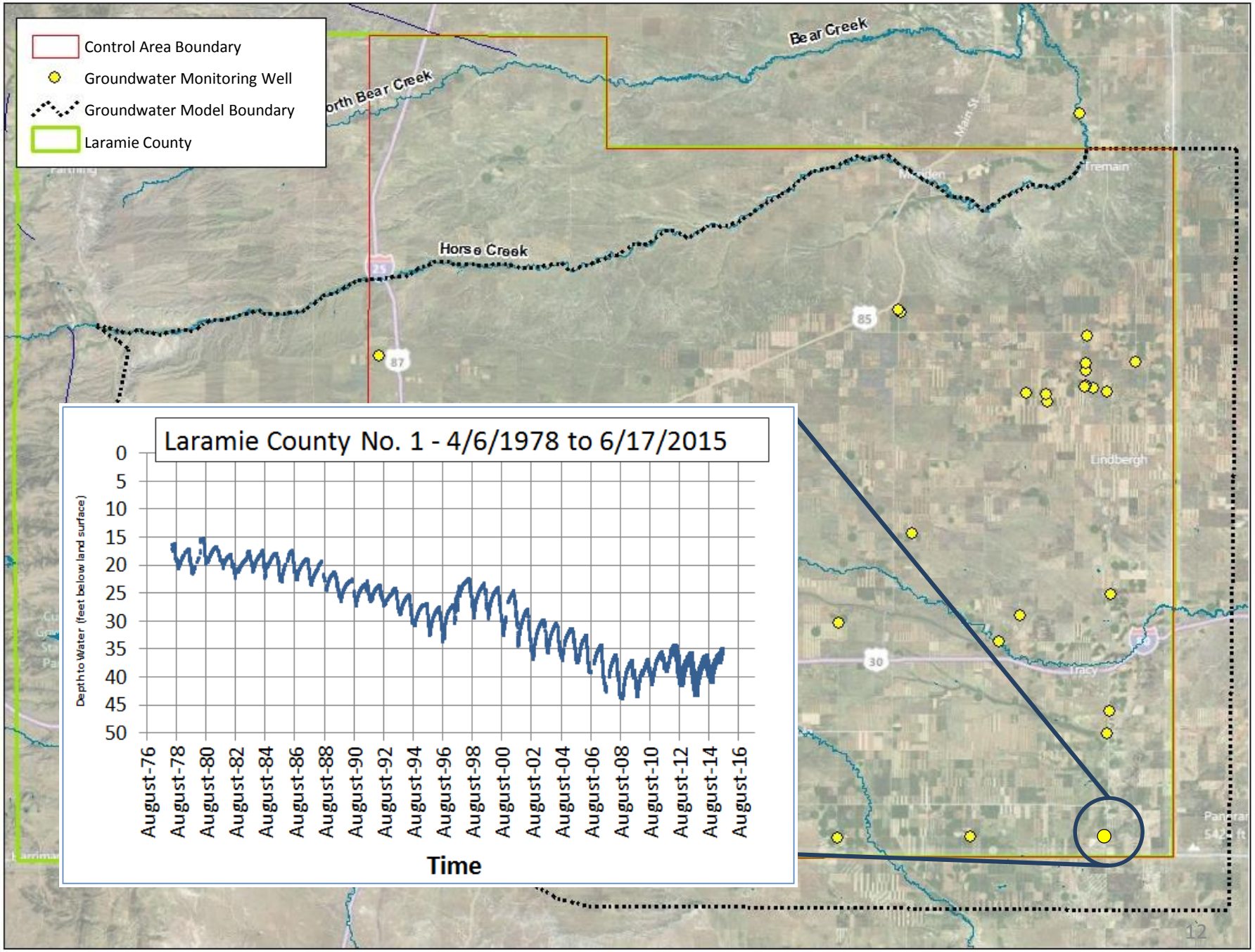


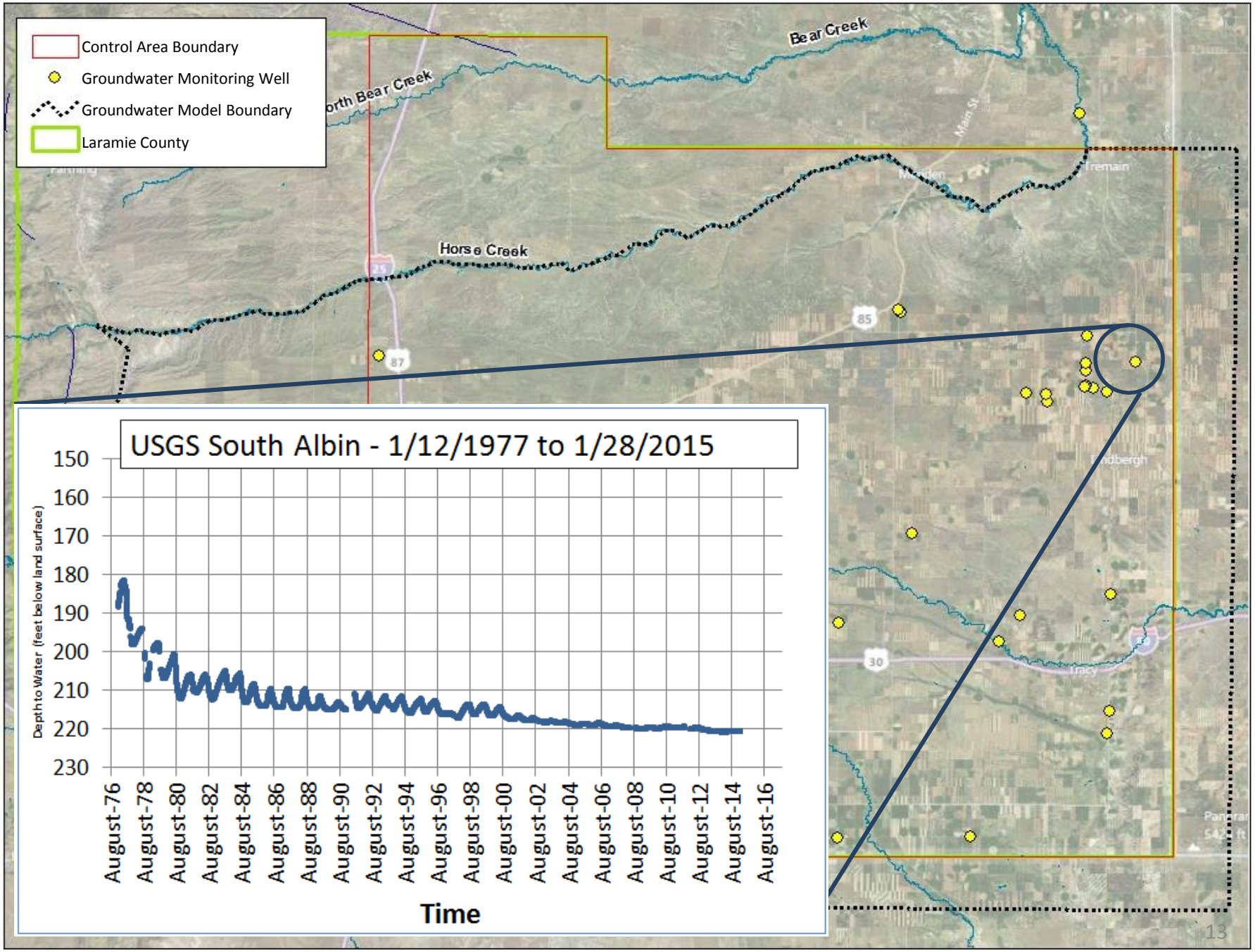

Control Area Boundary
Groundwater Monitoring Well
Groundwater Model Boundary
Laramie County
Laramie County No. 18 - 8/13/2004 to 6/18/2015
Depth to Water (feet below land surface)
128.2
128.4
128.6
128.8
129
129.2
129.4
129.6
129.8
130
August-04
August-06
August-08
August-10
August-12
August-14
August-16
Time
Horse Creek
Lodgepole Creek
Crow Creek
Lone Tree Creek
Cheyenne
South Greeley
Hillsdale
Tracy
Gleason

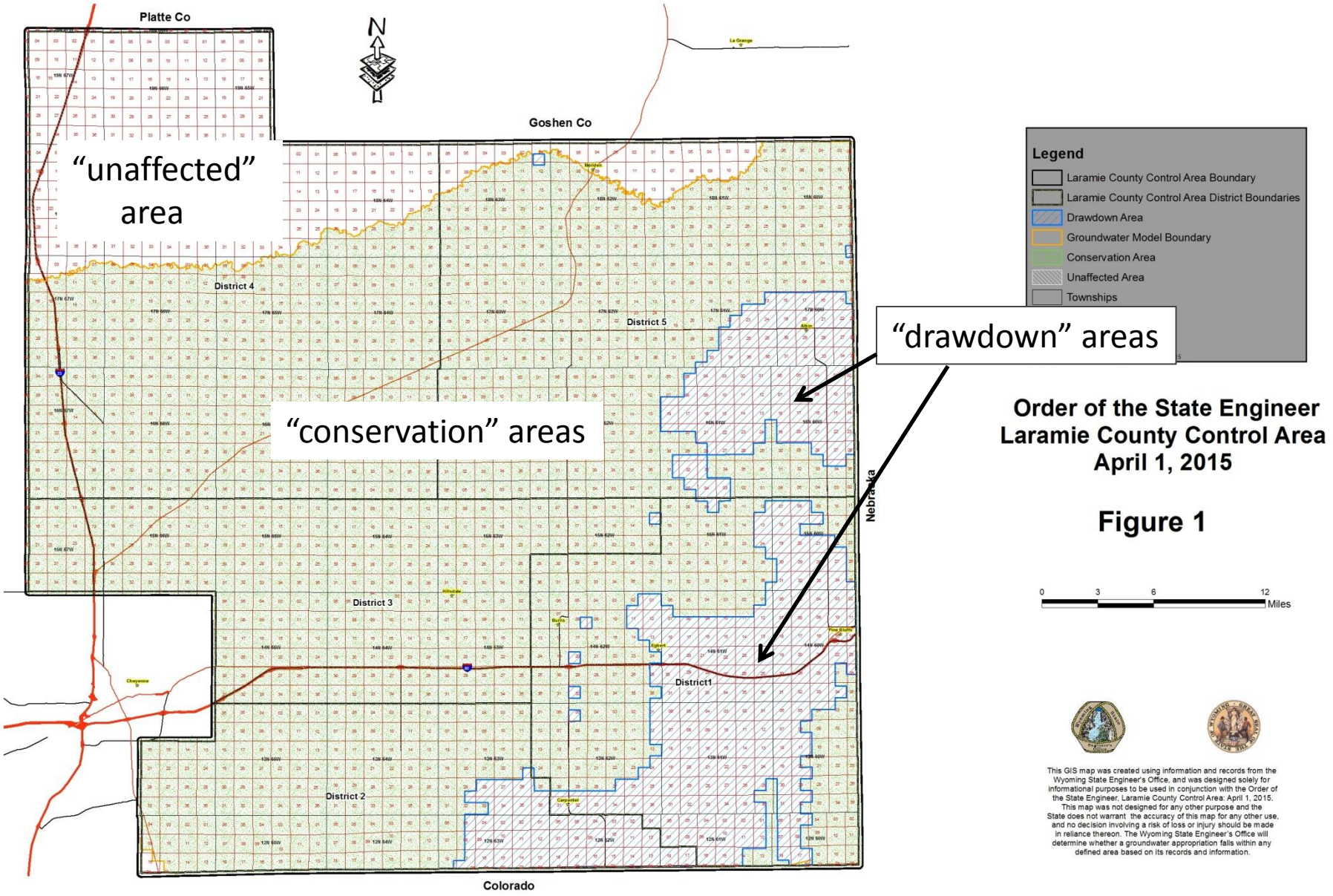


Control Area Boundary
Groundwater Monitoring Well
Groundwater Model Boundary
Laramie County
Laramie County No. 4 - 4/10/1978 to 6/16/2015
Depth to Water (feet below land surface)
Time
North Bear Creek
Horse Creek
Lodgepole Creek
Crow Creek
Lone Tree Creek
Islay
Ranchettes
Francis E Warren Air Force
Cheyenne
South Greeley
Durham
Hillsdale
Lindbergh
Tracy
Archer
Granite Canon
Gleason
Harriman
Curt Gowdy State Park


Control Area Boundary
Groundwater Monitoring Well
Groundwater Model Boundary
Laramie County
Bear Creek
Horse Creek
Lodgepole Creek
Tremain
Lindbergh
Hillsdale
Tracy
USGS SE Carpenter - 1/11/1977 to 6/17/2015
Depth to Water (feet below land surface)
30
40
50
60
70
80
90
August-76
August-78
August-80
August-82
August-84
August-86
August-88
August-90
August-92
August-94
August-96
August-98
August-00
August-02
August-04
August-06
August-08
August-10
August-12
August-14
August-16
Time


Control Area Boundary
Groundwater Monitoring Well
Groundwater Model Boundary
Laramie County
Bear Creek
North Bear Creek
Horse Creek
Tremain
Lindbergh
Tracy
Laramie County No. 1 - 4/6/1978 to 6/17/2015
Depth to Water (feet below land surface)
0
5
10
15
20
25
30
35
40
45
50
August-76
August-78
August-80
August-82
August-84
August-86
August-88
August-90
August-92
August-94
August-96
August-98
August-00
August-02
August-04
August-06
August-08
August-10
August-12
August-14
August-16
Time


Control Area Boundary
Groundwater Monitoring Well
Groundwater Model Boundary
Laramie County
Bear Creek
Horse Creek
Tremain
Tracy
USGS South Albin - 1/12/1977 to 1/28/2015
Depth to Water (feet below land surface)
150
160
170
180
190
200
210
220
230
August-76
August-78
August-80
August-82
August-84
August-86
August-88
August-90
August-92
August-94
August-96
August-98
August-00
August-02
August-04
August-06
August-08
August-10
August-12
August-14
August-16
Time

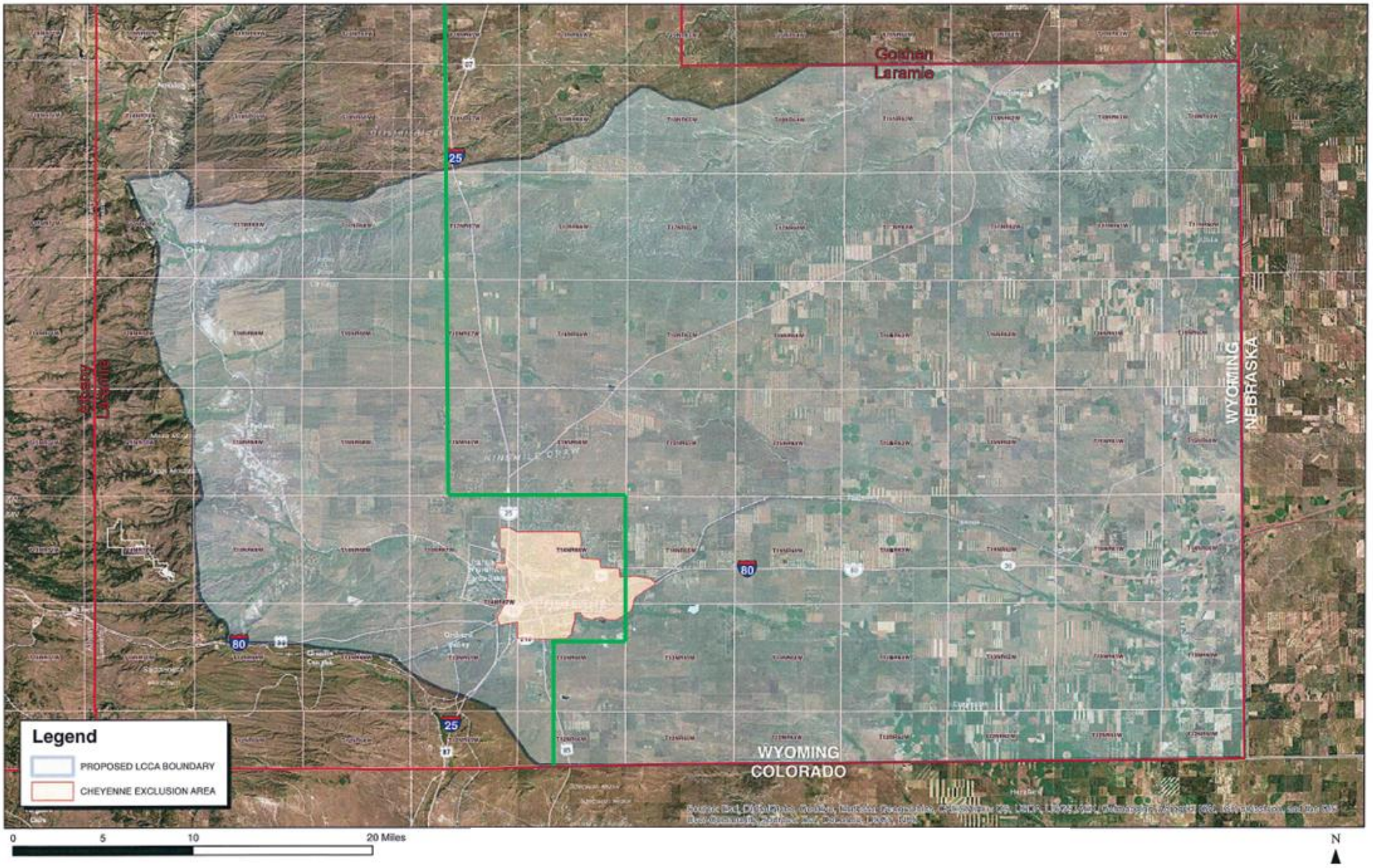

Platte Co
Goshen Co
Colorado
Nebraska
"unaffected" area
"conservation" areas
"drawdown" areas
District 1
District 2
District 3
District 4
District 5
Legend
Laramie County Control Area Boundary
Laramie County Control Area District Boundaries
Drawdown Area
Groundwater Model Boundary
Conservation Area
Unaffected Area
Townships
Order of the State Engineer
Laramie County Control Area
April 1, 2015
Figure 1
0 3 6 12
Miles
This GIS map was created using information and records from the Wyoming State Engineer's Office, and was designed solely for informational purposes to be used in conjunction with the Order of the State Engineer, Laramie County Control Area: April 1, 2015. This map was not designed for any other purpose and the State does not warrant the accuracy of this map for any other use, and no decision involving a risk of loss or injury should be made in reliance thereon. The Wyoming State Engineer's Office will determine whether a groundwater appropriation falls within any defined area based on its records and information.

WELL SPACING REQUIREMENTS FOR NEW PERMITS

HIGH PLAINS AQUIFER	Stock/Dom	Miscellaneous ≤5 acre-feet	>5 and <40 acre-feet	Large Capacity
Drawdown area	1 per lot or 1 per 10 acres.	0.5 mile from non DOM and STO wells. Annual static water level measurement.	No new permits.	
Conservation area	1 per lot or 1 per 10 acres.		1 per 1/4 1/4 or 40 acres. Annual static water level measurements. Possible monitor well. Reduction >20% of original water column prohibited.	1.5 mile spacing from other large cap wells. Monitor well in same interval within 500'. Annual static water level measurement. Reduction >20% of original water column prohibited.
Unaffected area	No restrictions.		Annual static water level measurement.	
UNDERLYING UNITS	Stock/Dom	Miscellaneous ≤5 acre-feet	>5 and <40 acre-feet	Large Capacity
Underlying Units	1 per lot or 1 per 10 acres.		1 per 1/4 1/4 or 40 acres. Annual static water level measurements. Possible monitor well. Reduction >20% of original water column prohibited.	1.5 mile spacing from other large cap wells. Monitor well in same interval within 500'. Possible shallow monitor well. Annual static water level measurement. Reduction >20% of original water column prohibited.

Petition to Modify Boundaries of LCCA

- Petition originally received on September 19, 2014
- Amended petition received November 20, 2015
- Hearing held on January 26, 2016
  - Board of Control denied the petition February 24, 2016
  - Order issued April 12, 2016



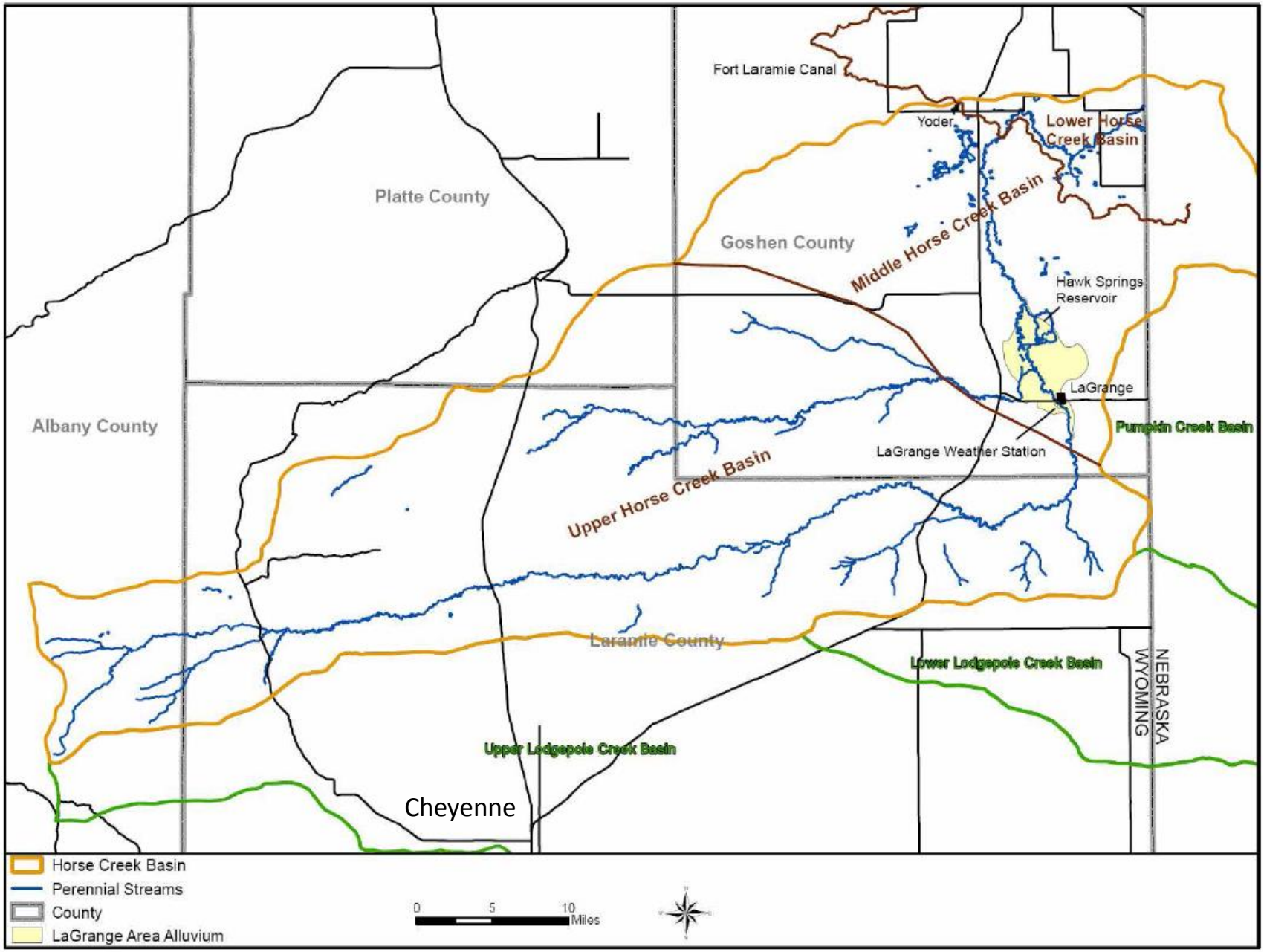
Petition to Modify the Boundaries of the Laramie County Control Area

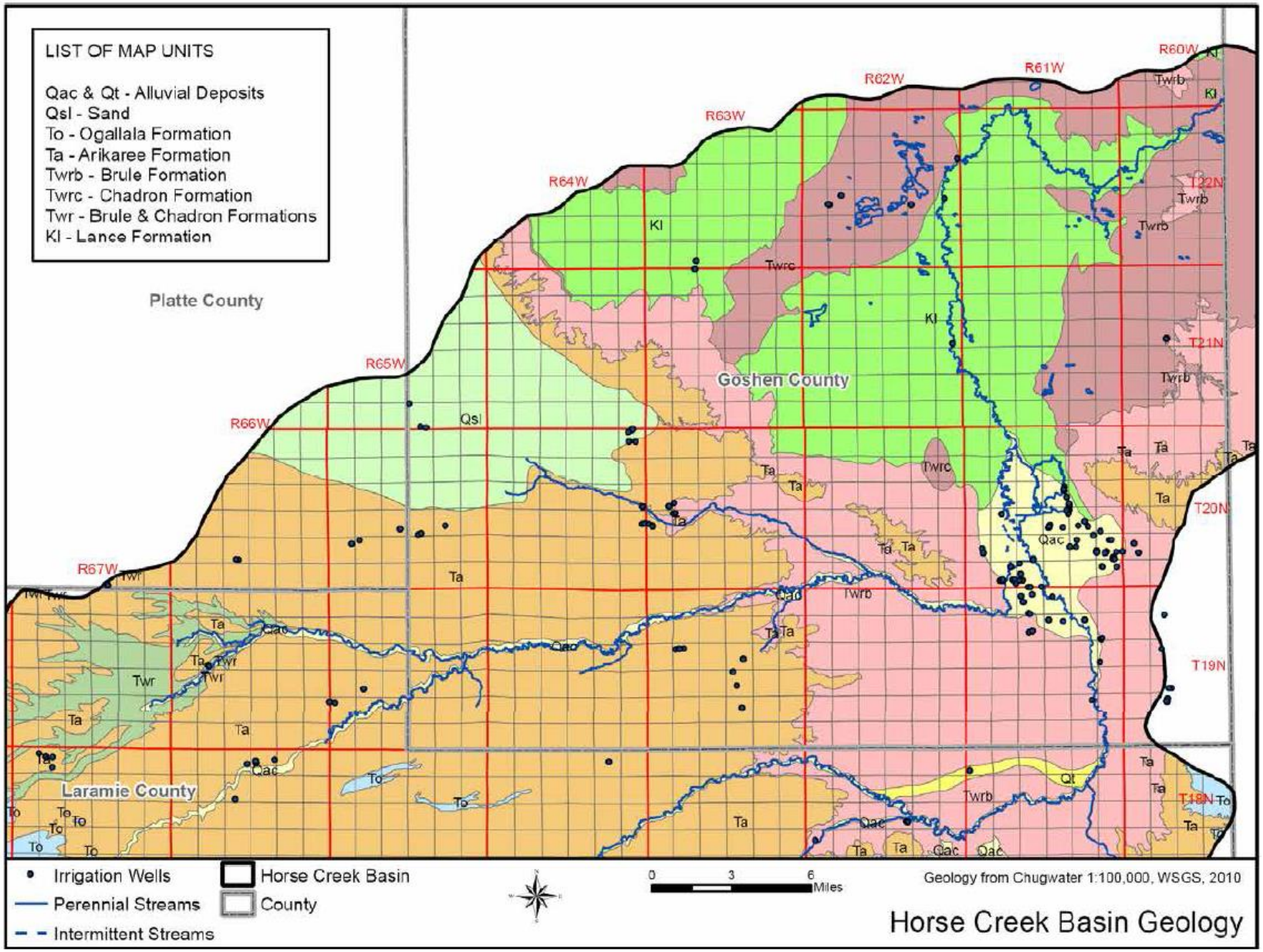
Horse Creek/LaGrange Aquifer Issues

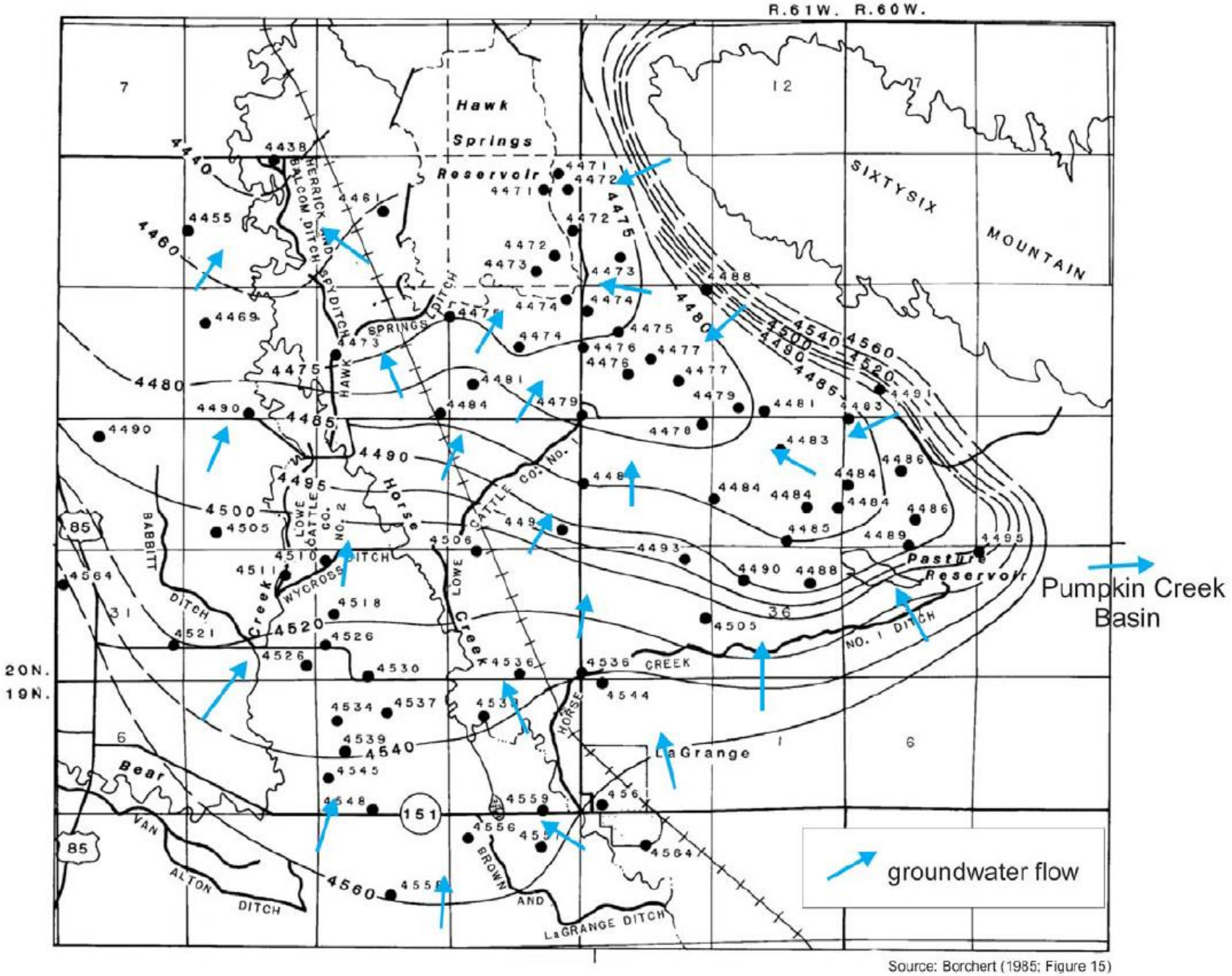
- For decades, the surface water users (primarily HCCD) and groundwater users have had disagreements:
  - Surface water users claimed junior wells depleted Horse Creek.
  - Groundwater users, often with junior surface water rights, would divert in winter for aquifer recharge around their wells. They were rarely in priority to divert during the irrigation season.
  - Winter diversions, if not made, are storable flows for the HCCD senior reservoir ("Hawk Springs Reservoir"). These diversions were clearly a source of irritation.

Horse Creek/Lagrange Aquifer Issues – Cont'd

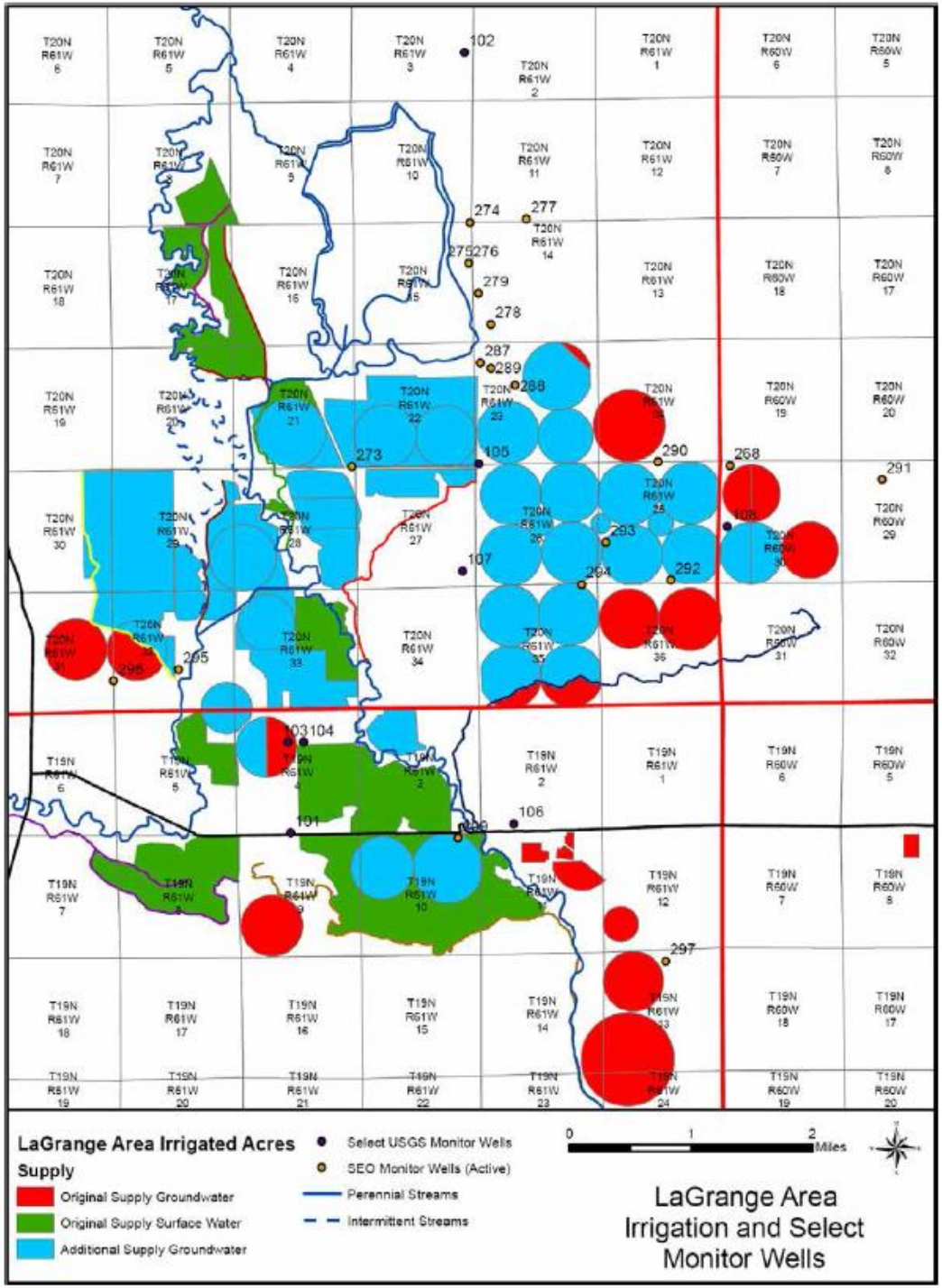
- In 2011-2012, SEO commissioned a groundwater study which confirmed Horse Creek and the LaGrange Aquifer were "so interconnected as to constitute in fact one source of supply." With this finding, our law requires the rights be contained in a "single schedule of priorities."
- Junior groundwater users immediately found themselves vulnerable to a call from the senior surface water rights. They attempted to mitigate a future call by bypassing otherwise historically diverted flows in the winter of 2012-13 for benefit of Hawk Springs Reservoir.
- In winter 2012-spring 2013, we worked with the groundwater and surface water appropriators to try and find a solution all could live with (WY statutes allow such a private agreement to be sought and entered). Knowing reaching such an agreement was uncertain, SEO began crafting an Order to enter should it be needed. A statutorily-required hearing was held in April, 2013.
- On June 18, 2013, a call for regulation was received from HCCD, essentially killing the private agreement process.
  - The Water Commissioner responded by regulating all junior wells and diversions off.
  - This decision was appealed to the Division Superintendent, who was swayed by the mitigation efforts the well users had initiated, and totally overruled the water commissioner, turning everything back on again.
  - This second decision was appealed to me, and my decision was to issue the Order that had been in the works.

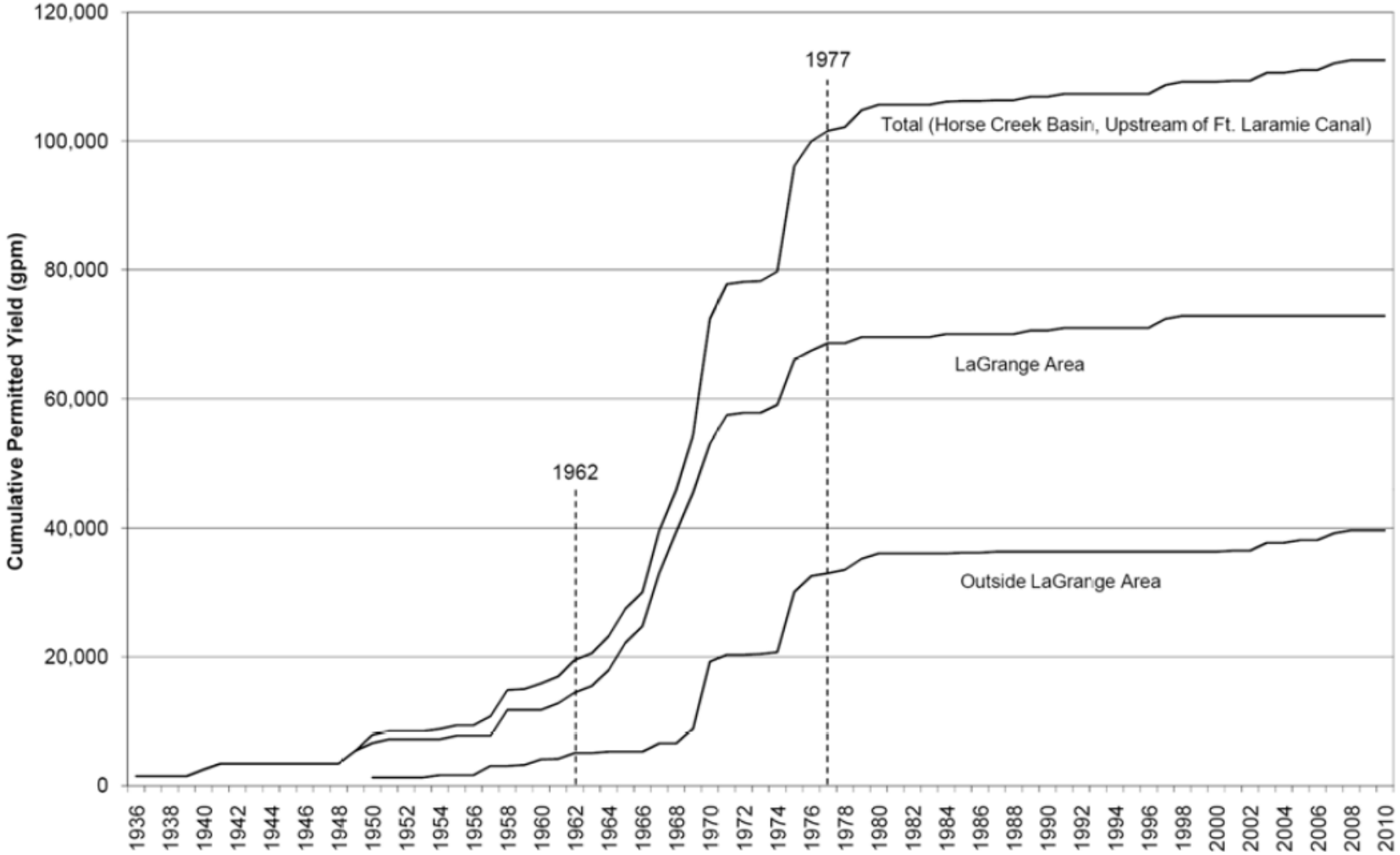

Fort Laramie Canal
Yoder
Lower Horse Creek Basin
Platte County
Goshen County
Middle Horse Creek Basin
Hawk Springs Reservoir
LaGrange
Albany County
Pumpkin Creek Basin
LaGrange Weather Station
Upper Horse Creek Basin
Laramie County
Lower Lodgepole Creek Basin
NEBRASKA
WYOMING
Upper Lodgepole Creek Basin
Cheyenne
Horse Creek Basin
Perennial Streams
County
LaGrange Area Alluvium
0
5
10
Miles


LIST OF MAP UNITS
Qac & Qt - Alluvial Deposits
Qsl - Sand
To - Ogallala Formation
Ta - Arikaree Formation
Twrb - Brule Formation
Twrc - Chadron Formation
Twr - Brule & Chadron Formations
Kl - Lance Formation
Platte County
Goshen County
Laramie County
R60W
R61W
R62W
R63W
R64W
R65W
R66W
R67W
T22N
T21N
T20N
T19N
T18N
Irrigation Wells
Perennial Streams
Intermittent Streams
Horse Creek Basin
County
0 3 6 Miles
Geology from Chugwater 1:100,000, WSGS, 2010
Horse Creek Basin Geology



Source: Borchert (1985; Figure 15)


LaGrange Area Irrigated Acres
Supply
Original Supply Groundwater
Original Supply Surface Water
Additional Supply Groundwater
Select USGS Monitor Wells
SEO Monitor Wells (Active)
Perennial Streams
Intermittent Streams
0
1
2
Miles
LaGrange Area
Irrigation and Select
Monitor Wells



Horse Creek Basin Irrigation Wells
Cumulative Permitted Yield

The Horse Creek Order:

- Defined the affected area and closed it to the issuance of further groundwater permits (excepting deminimus stock and domestic)
- Ordered the adjudication of all unadjudicated permits.
- Limited any wintertime diversions to those applied to irrigation (soil moisture). Diversions for groundwater recharge were disallowed.
- Meters or other measuring devices were ordered in for all wells and diversions, unless they were already in place.
- Groundwater pumping for irrigation was nominally limited to 12 acre-inches per acre (1 foot of water) for defined acres. Some flexibility was allowed; the Order runs for three years, and up to 3 inches could be saved in one year for subsequent use. The maximum pumpage allowed was 36 inches in 3 years. Annual reporting of use was required.
- As long as this pumping limit was not exceeded, no call for regulation of groundwater would be entertained.

The Horse Creek Order: cont'd

- The Order runs through water year 2016, at which point the annual pumping data will be reviewed to determine if the Order should be modified, terminated, or remain in effect as originally entered.
- If no new Order is issued by April 1, 2017, the current Order remains in force.
- Clarifying guidance was needed. I issued that clarification following issuance of the Order, dealing with things like pooled supplies, overlapping acres, etc.


Thank you
Questions?